1/8/18

"Our greatest weakness lies in giving up. The most certain way to succeed is always to try just one more time." -Thomas Edison

HW: Worksheet "Solving Rational Inequalities" #3, 5, 7
Test 3 on Friday 1/12

AIM: How do we solve Rational Inequalities?

Warm Up:

1. Solve by completing the square: $3x^2+20x+36=4$

$x^2+\frac{20}{3}x+\boxed{\frac{100}{9}}=-\frac{32}{3}+\boxed{\frac{100}{9}}$

$\frac{3x^2}{3}+\frac{20x}{3}=-\frac{32}{3}$ (−36 −36)

$\frac{20}{3}\div 2=\frac{20}{6}$

$\left(\frac{20}{6}\right)^2=\frac{400}{36}=\frac{100}{9}$

$\left(x+\frac{10}{3}\right)^2=\frac{4}{9}$

$x+\frac{10}{3}=\pm\sqrt{\frac{4}{9}}$

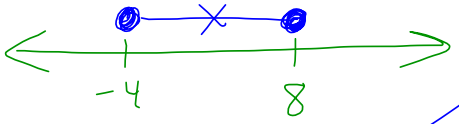
$x+\frac{10}{3}=\pm\frac{2}{3}$

$x=-\frac{10}{3}\pm\frac{2}{3}$

$-\frac{10}{3}+\frac{2}{3}=\left(-\frac{8}{3}\right)$

$-\frac{10}{3}-\frac{2}{3}=-\frac{12}{3}=(-4)$

2. Solve and express your answer in interval notation: $x^2-4x\le 32$



$[-4,8]$

$x^2-4x-32\le 0$ (−32 −32)

closed circles

$(x-8)(x+4)$

$x=8 \quad x=-4$

GOLI

Guidelines for solving nonlinear inequalities:

- Move all terms to one side of the inequality. (If dealing with rational expressions, get a common denominator.)
- Factor completely.
- Set each factor equal to zero. These numbers will divide your number line.
- Make a sign chart by dividing the number line into intervals found in step 3.
- Use a test value to determine the sign in each interval.
- Determine the solution of the inequality by examining the sign values.

For each inequality below, express its solution set 3 ways:
(a) As a number line.
(b) Using set-builder notation.
(c) Using interval notation.

1) $\frac{x+4}{2-x} \geq 0$ — positive; open circle

(*) Open circles always for any value from the denominator!!
Numerator values follow the inequality symbol
$\leq \geq$ closed
$< >$ open

$x+4=0$
$x=-4$
closed

$2-x=0$
$+x \quad +x$
$2=x$
open

Test	-4	Test	2	Test
-5		0		3
$\frac{-5+4}{2-(-5)}$		$\frac{0+4}{2-0}$		$\frac{3+4}{2-3}$
$\frac{-1}{7}$		$\frac{4}{2}$		$\frac{7}{-1}$
negative		positive		negative

SB: $\{x \mid -4 \leq x < 2\}$

int: $[-4, 2)$

2) $\frac{x}{x+2} < 0$ — negative

$x=0$
open

$x+2=0$
$x=-2$
open

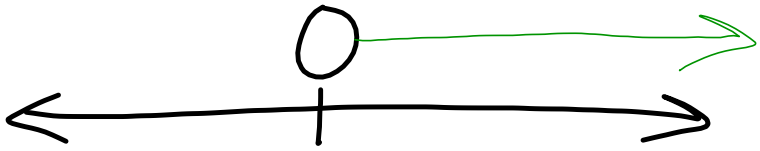
Test	-2	Test	0	Test
-3		-1		100
$\frac{-3}{-3+2}$		$\frac{-1}{-1+2}$		$\frac{100}{100+2}$
$\frac{-3}{-1}=3$		$\frac{-1}{1}=-1$		$\frac{100}{102}$
positive		negative ✓		positive

SB: $\{x \mid -2 < x < 0\}$

Int: $(-2, 0)$

3) $\frac{6}{x-3} > 0$ no variable, positive

$x-3=0$
$x=3$
open



Test 2: $\frac{6}{2-3}=\frac{6}{-1}=-6$ negative

3

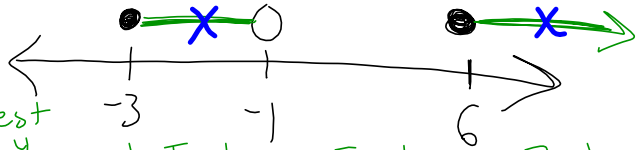
Test 157,624: $\frac{6}{157624-3}=\frac{6}{157621}$ positive ✓

SB: $\{x \mid 3<x\}$

Int: $(3,\infty)$

6) $\frac{(6-x)(3+x)}{x+1} \leq 0$ negatives

$6-x=0$ $3+x=0$ $x+1=0$
$6=x$ $x=-3$ $x=-1$
closed closed open



Test -4: 3.33 positive

-3 -1

Test -2: -8 negative ✓

Test 3: 4.5 positive

6

Test 37: -32.63 negative ✓

SB: $\{x \mid -3 \leq x < -1 \text{ or } 6 \leq x\}$ ✓

Int: $[-3,-1) \cup [6,\infty)$